deflection yoke 14 having a horizontal deflection coil 12 and a vertical deflection coil 13 is provided outside from the neck 5 of the glass tube body 7 to the funnel 6. A magnet, a so-called centering magnet 9 for adjusting an electron beam such that the electron beam scans an effective screen, i.e., a fluorescent surface is disposed at a position closer to a front portion of the deflection yoke 14. The centering magnet 9 comprises two ring-like double-pole magnets (permanent magnets) 9a and 9b.

Beginning on page 3, line 2:

As shown in FIG. 4, the conventional flat cathode-ray tube 1 causes coma aberration which leaves a trail of light behind a luminescent spot on the screen panel 4 like [Mercury] mercury. A beam spot 17 is visually seen with halation, and image quality is degraded.

Beginning on page 3, line 7:

The present inventors researched a cause of degradation of this beam spot and as a result, [and] they found that a magnetic field due to the centering magnet 9 on the side of the neck influences the beam spot. That is, by the effect of the magnetic field from the centering magnet 9, as shown in FIG. 3, the electron beam 15 is deflected before the beam 15 enters a main lens 16M, and the electron beam 15 is separated from the tube axis 11, i.e., a so-called "axis-separation" is generated. Since the axis-separation is generated on the side of a cathode K of the main lens 16M, the electron beam 15 radiates onto a

position deviated from a center O of the main lens 16M. Therefore, the coma aberration is generated, the beam spot 17 attended with halation is generated, which degrades the image quality.

Beginning on page 9, line 24:

The flat cathode-ray tube 21 of this mode includes a glass body 26 comprising a front panel 22, a screen panel 23 and a funnel 25 having a neck 24. These members constituting the glass body 26 are [jointed] joined to one another through frit glasses. A fluorescent surface 27 is formed on an inner surface of the screen panel 23. An electron gun 28 of the present invention which will be described [latter] later is disposed in the neck 24 of the funnel 25 such that a center axis 39 coincides with a tube axis 32. Reference number 34 represents a frit joint portion. The glass body 26 is formed flatly such that the glass body 26 is laterally longer in the horizontal direction (vertical direction with respect to a paper sheet of FIG. 5) as a whole. The front panel 22 is formed into a transparent flat plate-like shape at a position opposed to the screen panel 23. The screen panel 23 is disposed diagonally or in parallel to a direction crossing the tube axis 32 diagonally. In FIG. 5, the screen panel 23 is disposed diagonally with respect to the tube axis 32.

Beginning on page 10, line 23:

A centering magnet 33 for adjusting an electron beam such that the electron beam scans an effective screen, i.e., a fluorescent surface 27 is disposed at an outer side of the neck

24 corresponding to a front portion of the deflection yoke 31. As shown in FIG. 6, the centering magnet 33 comprises two ring-like double-pole magnets (permanent magnets) 33a and 33b.

Beginning on page 11, line 20:

FIG. [7] 6 shows a mode of the electron gun 28 according to the present invention.

Beginning on page 13, line 2:

A direction to separate the second grid G2 is set to a direction in which the axis-separating amount of the electron beam becomes small. That is, as shown in FIG. [24]7, the electron beam before the beam enters the main lens is separated downward from the tube axis. Therefore, in the electron gun 281 of this mode, the second grid G2, i.e., its electron beam through hole hG2 is previously separated (deviated) in the same direction as the axis-separation direction (in a minus direction when the axis-separation direction of the electron beam is set in the minus direction) by a predetermined distance d which corresponds to an amount in which the axis-separating amount of the electron beam can be corrected.

Beginning on page 13, line 20:

In the flat cathode-ray tube 21 of this mode, the axis of the electron beam through hole hG2 of the second grid G2 which contributes to the formation of the prefocus lens 35P is separated in the same direction as the axis-separation direction by a distance

corresponding to the axis-separating amount of the electron beam. Therefore, as shown in FIG. 8, a lens effect of an upper side P1 of the prefocus lens 35P is strong, and the lens effect of a lower side P2 of the prefocus lens 35P is weak. To appearance, the axis prefocus lens 35P is separated. That is, since the electron beam through hole hG2 of the second grid G2 is deviated, an upper edge of the electron beam through hole hG2 approaches the tube axis 32 to strengthen the upper magnetic field strength, and a lower edge of the electron beam through hole hG2 is separated from the tube axis 32 to weaken the lower magnetic field strength. As a result, the lens effect of the upper side P1 is strong, and the lens effect of the lower side P2 is weak. For this reason, the electron beam 36 passing through the prefocus lens 35P moves (i.e., is bent) in an upward direction in which the magnetic field is strong and the electron beam 36 is refracted so as to return, and passes through the center 37 of the main lens 35M. With this design, it is possible to eliminate the halation caused by the coma aberration, and to enhance the resolution.

Beginning on page 15, line 3:

An electron gun [282] 283 of this mode comprises a first grid G1, a second grid G2, a third grid G3 and a fourth grid G4. These grids G1 to G4 are arranged in this order along a direction of the tube axis 32. A cathode lens 35K is formed between a cathode K, the first grid G1 and the second grid G2. A prefocus lens 35P is formed between the second grid G2 and the third grid G3. A main lens 35M is formed between the third grid G3 and the fourth grid G4. In this example,

the electron gun is formed as a so-called bipotential type electron gun.

Beginning on page 18, line 17:

In this mode, first, as shown in FIGS. 16, the first grid G1 (FIG. 16A) and the second grid G2 (FIG. 16B) are prepared first. The first grid G1 is formed with the electron beam through hole hG1 having a hole center which coincides with one reference position corresponding to a position on the center axis 39, and the first grid G1 is also formed with a pair of index holes 51 (51A, 51B) at other reference positions. The second grid G2 is formed with the electron beam through hole hG2 having a hole center at a position corresponding to one reference position corresponding to a position on the center axis 39. The second grid G2 is also formed with a pair of index holes 52 (52A, 52B) at other reference positions.

Beginning on page 19, line 15:

Further, the third grid G3 and the fourth grid G4 are positioned and then, a pair of bead glasses [54] 55 ([54A, 54B]55A, 55B) are pushed against the first grid G1 to the fourth grid G4, thereby carrying out a beading processing. Thereafter, the cathode K is disposed in the first grid G1 to obtain the final electron gun 282 shown in FIG. 19.

Beginning on page 19, line 24:

According to the producing method of the above-described electron guns 281, 282 and 283, when the method is used for the

flat cathode-ray tube, it is possible to easily produce an electron gun capable of correcting an effect of a magnetic field caused by the centering magnet 33, i.e., an electron gun in which an electron beam passing through the prefocus lens 35P passes the center of the main lens 35M to obtain an excellent beam spot.

Beginning on page 20, line 11:

A flat cathode-ray tube 61 according to the present mode shown in FIG. 11 includes a glass tube body 66. The glass tube body 66 comprises a screen panel 62 which is in parallel to the tube axis 32, a back panel 63, and a funnel 65 having a neck 64, and these constituent members of the glass tube body 66 are [jointed] joined to one another through frit glasses. A fluorescent surface 67 is formed on an inner surface of the screen panel 62. The electron gun 28 of the present invention is disposed in the neck 64 of the funnel 65 such that the center axis 39 coincides with the tube axis 32. In this flat cathode-ray tube 61, the screen panel 62 is disposed in parallel to the tube axis 32. Reference number 34 represents a frit junction. The glass body 66 is formed flatly such that the glass body 66 is laterally longer in the horizontal direction as a whole. The screen panel 62 is formed into a transparent flat-plate like shape and is disposed in parallel to the tube axis 32.

Beginning on page 21, line 18:

In this flat cathode-ray tube 61 of the present mode also, like the previous mode, an axis of the electron beam is

separated by an effect of the magnetic field of the centering magnet 33, but since the axis of the prefocus lens 35P of the electron gun 28 is separated, the axis-separation of the electron beam caused by the centering magnet 33 is offset, the electron beam passes through the center of the main lens 35M, the halation caused by the coma aberration is eliminated, and the resolution can be enhanced.

Beginning on page 27, line 6:

Table 2 shows a result of study of a [defective] defect rate of halation of the beam spot in a conventional flat cathode-ray tube and the flat cathode-ray tube produced by the present invention. As shown in Table 2, in the flat cathode-ray tube of the present invention in which the axis of the electron beam through hole hG2 of the second grid G2 was separated, the halation defective generation rate was 0%, and in the conventional flat cathode-ray tube, the defective generation rate was 10 to 15%. Incidentally, in the flat cathode-ray tube of the present invention, the number of defective tubes was zero (defective generation rate was 0%) among 423 cathode-ray tubes, and in the conventional flat cathode-ray tube, the number of defective tubes was 239 among 1885 cathode-ray tubes (defective generation rate was 12.7%). In the flat cathode-ray tube of the present invention, excellent result was obtained.

Beginning on page 27, line 21:

In the above examples, the present invention is applied to the bipotential type electron gun and to the flat cathode-ray tube having this electron gun, but the invention can also be applied to a unipotential type electron gun and a flat cathode-ray tube having such an electron gun.

A15 amd.

Beginning on page 28, line 5:

Although the axis-separation of the electron beam caused by an effect of the magnetic field of the centering magnet 33 was corrected by the structure of the electron gun in the above examples, the present invention can also be applied to a case in which the electron beam is separated by an effect of a magnetic field of another magnet disposed outside the neck or another location instead of the centering magnet 33.